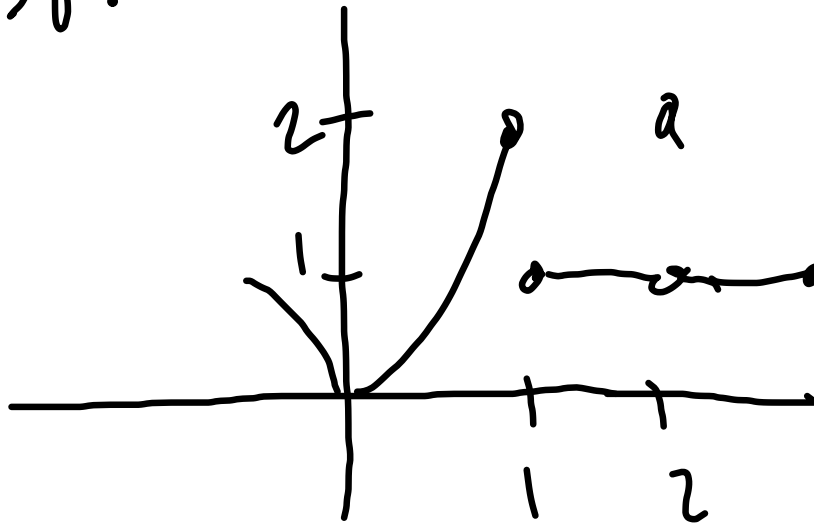


38.



$$\lim_{x \rightarrow 2} f(x) = 1$$

$$f(2) = 1$$

$$f) \lim_{x \rightarrow 1} f(x) =$$

$$\lim_{x \rightarrow 1^-} f(x) = 2$$

$$\lim_{x \rightarrow 1^+} f(x) = 1$$

$$\lim_{x \rightarrow 1} f(x) =$$

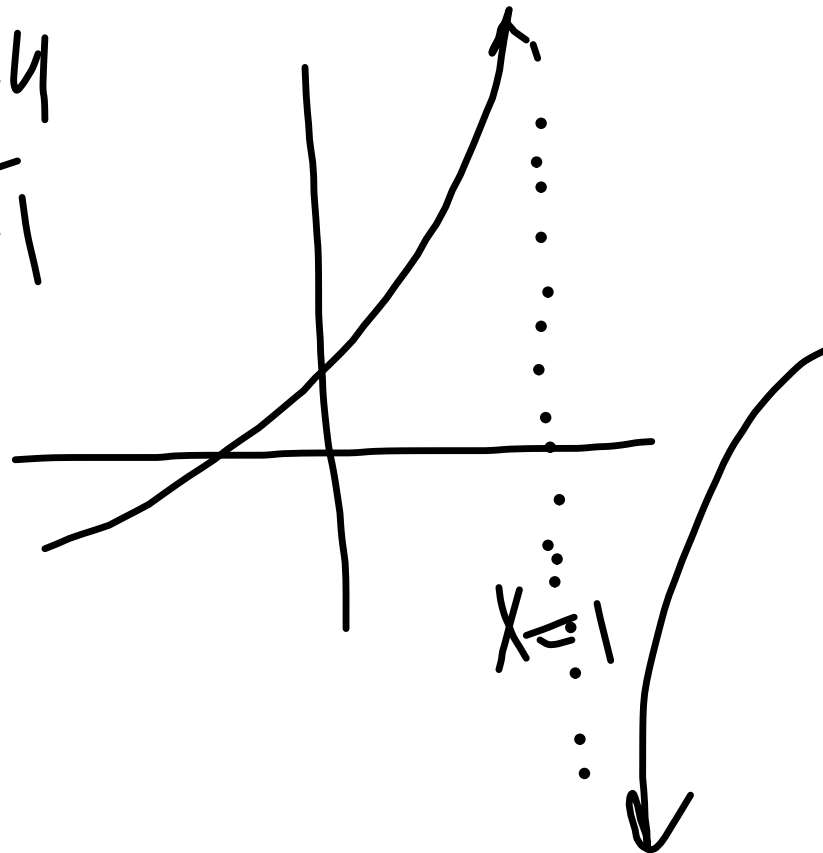
dne - reason
left \neq right

29. $\lim_{x \rightarrow 1} \frac{x^2 - 4}{x - 1}$

$\lim_{x \rightarrow 1^-} f(x) = \infty$
dne

$\lim_{x \rightarrow 1^+} f(x) = -\infty$

$\lim_{x \rightarrow 1} f(x)$ dne



$$\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2} = 4$$

$\frac{0}{0}$ let $x = 2$

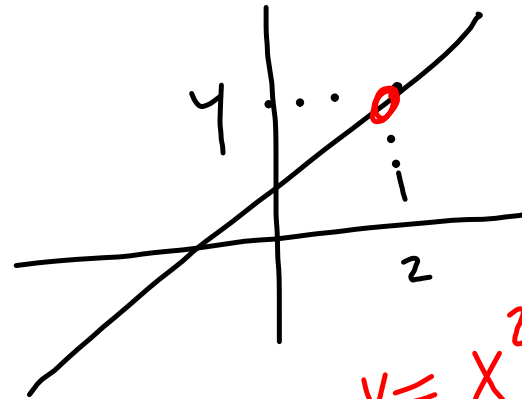
factor

$$\lim_{x \rightarrow 2} \frac{(x+2)(\cancel{x-2})}{\cancel{x-2}} = 4$$

$f(x)$ dne

$$\lim_{x \rightarrow 2} f(x) = 4$$

do graphically



$$y = \frac{x^2 - 4}{x - 2}$$

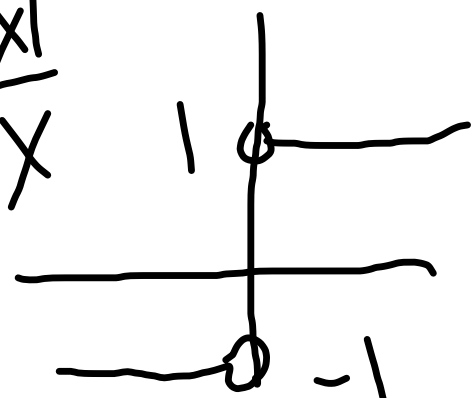
is a
line with
a hole

2.1 b more on limits

ways a limit fails to exist

1. left \neq right $y = \frac{|x|}{x}$

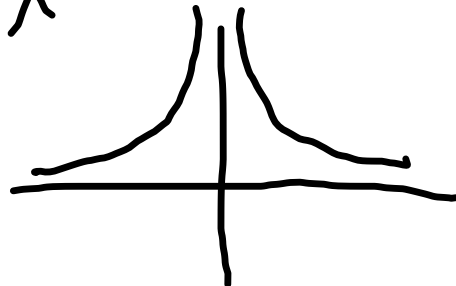
$\lim_{x \rightarrow 0} f(x) = \text{dne}$



The graph shows a coordinate plane with a horizontal x-axis and a vertical y-axis. The function $y = \frac{|x|}{x}$ is plotted as a horizontal line at $y = 1$ for $x > 0$ and a horizontal line at $y = -1$ for $x < 0$. There is an open circle at $(1, 1)$ and another open circle at $(-1, -1)$. The y-axis is not drawn for $x = 0$.

2. asymptotes

$$\lim_{x \rightarrow 0} \frac{1}{x^2} = \infty \text{ (dne)}$$



$$\lim_{x \rightarrow \infty} f(x) = 1$$

$$\lim_{x \rightarrow -\infty} f(x) = -1$$

do graphically

3. $\lim_{x \rightarrow 0} \sin\left(\frac{1}{x}\right)$

diverges by oscillation

↑
means limit does not exist

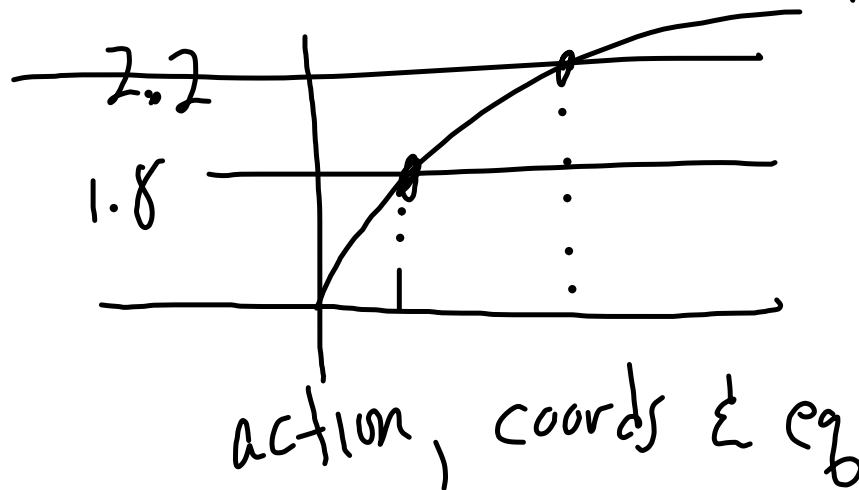
definition of limit, tolerances

$$\lim_{x \rightarrow 4} \sqrt{x} = 2$$

when x is close to 4

y is close to 2

How close should x be to 4
so that $1.8 \leq y \leq 2.2$

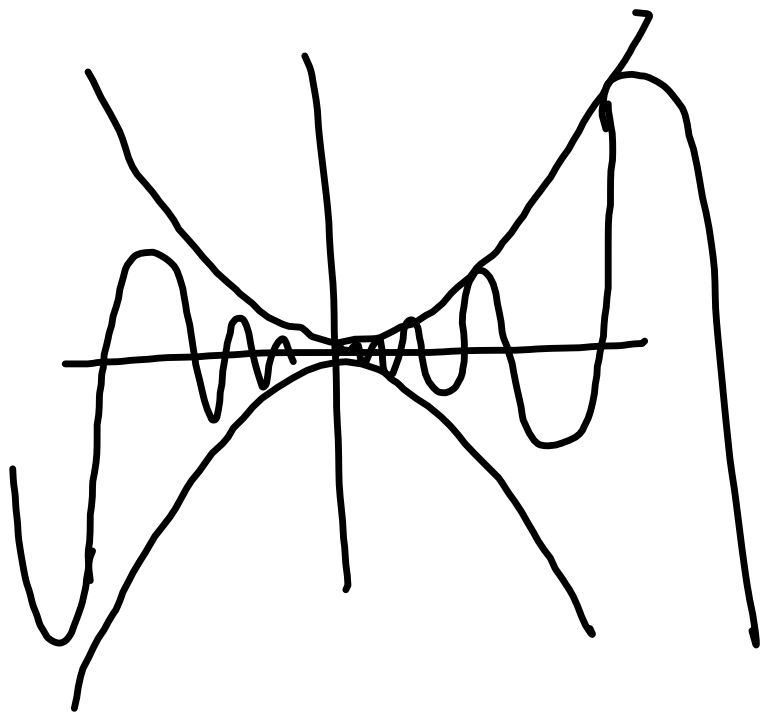


$$f1 = \sqrt{x}$$

$$f2 = 1.8$$

$$f3 = 2.2$$

$\lim_{x \rightarrow 0} x^2 \sin \frac{1}{x} = 0$ by the sandwich thm.



$$-1 \leq \sin \frac{1}{x} \leq 1$$

mult by x^2

$$-x^2 \leq x^2 \sin \frac{1}{x} \leq x^2$$